UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/714,194 | 11/17/2003 | Radislav Alexandrovich Potyrailo | RD-26349-3 | 9351 |

6147 7590 05/17/2005

GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
PATENT DOCKET RM. BLDG. K1-4A59
NISKAYUNA, NY 12309

| EXAMINER | |
|---|---|
| GAKH, YELENA G | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1743 | |

DATE MAILED: 05/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/714,194 | POTYRAILO ET AL. | |
| | Examiner | Art Unit | |
| | Yelena G. Gakh, Ph.D. | 1743 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *17 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-50* is/are pending in the application.

4a) Of the above claim(s) *1-25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *26-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11.17.03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-24, drawn to an apparatus for detecting chemicals, classified in class 422, subclass 82.06.

   II. Claims 25-50, drawn to a method for detecting chemicals, classified in class 436, subclass 164.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be used in organic synthesis for conducting selective reactions and analyzing the products of the reactions.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

2. During a telephone conversation with Shawn McClintic on 05/12/05 a provisional election was made without traverse to prosecute the invention of Group II, claims 25-50. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-24 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 25-50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 25, 29 and 46 recite "at least a chemical species" in the preamble, which renders the claims indefinite, since it is not clear, which other species, besides chemicals, are meant to be detected by this apparatus. Also, it is not quite clear, what is meant by "determining a location" of the chemical species. Determining the presence of the chemical species in the environment inherently defines their location, and therefore it is not clear, what is meant by specific emphasizing "determining location" of the chemical species in these claims? If something more particular is meant by "determining location", the claim should be more specific in order to make it clear, what is really meant by this expression. For example, the terminology of the paper by Potyrailo and Hiftje, "Spatially resolved analyte mapping with time-of-flight optical sensors", can be used. The examiner interprets the claims as reciting an inherent determination of the species location upon detection of the species.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. **Claims 25-39, 46 and 48-50** are rejected under 35 U.S.C. 102(b) as being anticipated by Burgess (US 5,434,084).

Burgess discloses an apparatus and method for detecting a presence, determining a location, and quantifying an amount of chemical analytes, comprising providing a capillary with a permeable wall (8) to the analytes, delivering a fluid comprising a reagent, which is capable to selectively interact with analytes (col. 2, lines 63-68), into the capillary, and transferring a content of the capillary to an optical detector (Figure 1, col. 5, lines 50-56 and col. 6, lines 10-15), with the detector employing various optical methods. In one embodiment the optical

methods utilized are UV, visible light or IR spectroscopy (col. 3, lines 47-49). In another embodiment the optical methods are scattering and/or reflective index measurements (col. 4, lines 54-60). See also col. 5, lines 17-20: "the device is compatible with numerous spectroscopic techniques including, but not limited to, absorbance, luminescence, chemiluminescence, fluorescence and light scattering for the analyte modulation of the optical signal". The concentration of the analyte is determined from the response of the optical detector. The permeable wall of the capillary comprises materials selected from "rubber, porous polypropylene, such as Celgard X-20 or X-10, and porous teflon. Each of the semipermeable membranes has pore sizes that control the movement of molecules based on the size of the molecules. For example, the pore size may range from about **0.05 μm** [50 nm] to about **10 μm**. The permeable membrane may also be an ion exchange membrane to separate analytes by size and charge. More specifically, anion exchange membranes include aminated polystyrene, divinyl benzene, aminated polypropylene, aminated polyethylene, other aminated polymers and other polymers with functional groups, such as trimethyl amine, ethyl dimethyl amine, and dimethyl ethanol amine. Cation exchange membranes include Nafion.RTM., and sulfonated polystyrene, polyacrylates and polypropylene. The ion exchange membrane can also comprise radiation grafted polymers such as polypropylene, polyethylene, and polystyrene, with various charged functional groups. The choice of the semipermeable or ion exchange membrane depends upon the molecular size and charge characteristics of the analyte or analytes to be detected" (col. 7, line 68 and col. 8, lines 1-22). In one embodiment, Figure 4, "**a frit** [porous glass or ceramics] may be employed to prevent plugging of the sample capillary" (col. 12, lines 60-62), which corresponds to the subject matter of claims 9 and 10. Optical fibers are selected according to the application. "Fibers are available that cover most of the spectral region of the electromagnetic radiation spectrum from the **ultraviolet (220 nm) to the near-infrared**", which is in the range recited in claims 7 and 23 (col. 7, lines 17-20). "Microporous hollow fiber membranes [capillaries] were made of polypropylene and had **400 μm** [0.4 mm] internal diameters [claims 13 and 14], **0.03 μm** [30 nm] average pore size [claims 11 and 12], 40% porosity and **25 μm** wall thickness [claims 15 ad 16] (Hoechst Celanese, Charlotte, N.C., Model Celgard X-20) (Example 1, col. 13, lines 49-54). Burgess emphasizes, "by continuously

renewing the reagent in the probe, the response and recovery times are improved over static reagent sensors. The reagent flow in mixing within the probe, creates a steep gradient in the chemical potential of the analyte across the permeable membrane interface, which results in a rapid steady state concentration" (col. 9, lines 3-5) and "the inventive flow optrode can adjust the sensitivity and dynamic range to the concentration of the analyte or changes in concentration of the analyte by varying the flow rate, the reagent composition, or by operating in a stop flow mode. Therefore, the inventive device and the inventive method for using the inventive device offer significant advantages over previously developed optrodes" (col. 10, lines 19-26). The probe is capable of being used in different environment, including soil or during combinatorial synthesis.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. **Claims 40-45** are rejected under 35 U.S.C. 103(a) as being unpatentable over Burgess in view of abundant prior art, e.g. Miller et al. (US 4,666,672), Klainer et al. (US 5,059,790), Tabacco et al. (US 5,268,972), Mohr et al. (EP 928,966 A1), Donner et al. (ACS Symposium), Bakaltcheva et al. (Anal. Chim. Acta), Sano et al. (Anal. Sic.), Gladilovich et al. (Zh. Anal. Khimii).

While Burgess does not specifically disclose analytes (chemical species) recited in the claims indicated above, he repeatedly emphasizes that any analytes, which can chemically react with the reagents "to create a reaction product that modulates electromagnetic radiation differently from the unreacted reagent" (col. 2, lines 63-67, col. 4, lines 64-69 and col. 7, lines 1-9)) are potential analytes for the apparatus disclosed. Moreover, he mentions that "the probe has multiple analyte capability because the same probe can be used for a variety of different analytes simply by changing the nature and/or concentration of the reagent in the reservoir" (col. 5, lines 23-28).

Miller discloses optrode for detecting halogenated hydrocarbons, including "chloroform, methylchloroform, sym-tetrachloroform, phenylchloroform, carbon tetrachloride, dichloro-methane, trichloroethylene, 1,1,2-trichloroethane and the like" (col. 4, lines 58-62).

Klainer discloses reservoir fiber optic chemical sensors for detecting various analytes, including trichloroethylene (TCE) (col. 6, line 51).

Tabacco discloses "aromatic hydrocarbon optrodes for groundwater monitoring applications", including detecting aromatic compounds, such as benzene, toluene (PhMe), ethylbenzene and xylene (col. 3, lines 50-52).

Mohr teaches detecting cycloaliphatic, primary, secondary or tertiary aliphatic and aromatic amines, including pyridine and aniline, by fluorescence chemical sensors (Abstract, page 2, par. [0012], Tables 1-3, pages 14, 15, 16).

Donner and Bakaltcheva disclose "multi-analyte explosive detection using a fiber optic biosensor", including detecting trinitrobenzole (TNT) (Abstract).

Sano teaches "fluorometric determination of aromatic aldehydes with 1,4-dimethyl-3-carbamoylpyridinium chloride", including detection of benzaldehyde, furfural and 4-methoxybenzaldehyde (Abstract).

Gladilovich teaches "fluorometric determination of aromatic aldehydes with 1,2-diaminobenzene", including detection of banzaldehyde and its derivatives (Abstract).

It would have been obvious for anyone of ordinary skills in the art to modify Burgess' apparatus for detecting analytes recited in claims 17-22, 24, because, as numerous references demonstrate these are important chemicals for analysis (toxins, explosives, etc.), which are conventionally analysed by optical methods, i.e. with conventional optrodes (halogenated hydrocarbons, polynitroaromatic hydrocarbons, mono-substitututed benzene, pyridine), as disclosed by Miller, Klainer, Tabacco, Mohr, Donner and Bakaltcheva, or fluorometrically by reacting with reagents which give specific optical characteristics, as taught by Sano and Gladilovich, while Burgess indicated the advantages of his apparatus versus conventional optrodes and standard fluorescence methods.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (703) 306-5906. The examiner can normally be reached on 10:00am-6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (703) 308-4037. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

May 12, 2005

Yelena Gakh

YELENA GAKH
PRIMARY EXAMINER